



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,943	01/12/2005	Neville John Mattingley	MATTINGLEY-2682	4765

7590

11/15/2005

William H Holt  
Law Offices of William H Holt  
12311 Harbor Drive  
Woodbridge, VA 22192

EXAMINER
----------

BERNSHTEYN, MICHAEL

ART UNIT	PAPER NUMBER
----------	--------------

1713

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/520,943

Applicant(s)

MATTINGLEY ET AL.

Examiner

Michael Bernshteyn

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 01/12/05, 09/17/05
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 9-13 provide for the use of a membrane in a battery and in a fuel cell, a laminate in a fuel cell and in a battery, but, since the claims do not set forth any steps involved in the methods/processes, it is unclear what methods/processes applicant is intending to encompass. The claims are indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 9-13 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd. App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Kronfli et al. (GB Patent 2 309 701) in view of Coowar et al. (US Patent Application Publication 2003/0170545).

With regard to the limitation of instant claims 1, 4 and 7, Kronfli discloses a process for producing a porous polymeric membrane suitable for use in electrolyte material. A polymeric chain consisting primarily of **vinylidene fluoride**, onto which is **grafted** a mono-unsaturated **carboxylic acid, ester, or amide**. This may be used as **electrolyte in a lithium cell**, or may be combined with an insertion material to make a

Art Unit: 1713

**composite electrode for such a cell** (abstract). Kronfli discloses the process comprising the following steps: dispersing PVdF in a small amount of methanol (non-solvent) to which N-methyl pyrrolidone (NMP) and dimethylacetamide (DMA) were added to dissolve the PVdF; then the mixture was stirred and heated. The resulting slurry was cast onto a copper foil current collector and dried in a vacuum oven for 24 hours at 50 C (Example 1, page 5, line 35 through page 6, line 23) to evaporate the non-solvent and solvent and to obtain a membrane (Example 3, page 11, lines 1 through page 12, line 3).

Kronfli does not disclose that the boiling point of the non-solvent is higher than that of the solvent and the usage of octanol, decanol, dodecanol or a mixture thereof.

Coowar discloses that a lithium ion cell incorporates a porous polymer membrane, for example a microporous membrane (abstract). Such a microporous membrane may be cast from a solvent/non-solvent mixture, or from a latent solvent. The non-solvent should not only dissolve in the solvent, but it should be miscible with the solvent in substantially all proportions. **The boiling point of the non-solvent is preferably higher than that of the solvent**, preferably about 20<sup>0</sup>C higher. For example, the solvent might be **dimethylformamide**, or **dimethylacetamide**, in which case a suitable non-solvent is **1-octanol**, which soluble in those solvents and this boiling point is about 194<sup>0</sup>C. Alternative non-solvents would be 1-heptanol, 2-octanol, 4-octanol or 3-nonanol, which have the boiling point between 175<sup>0</sup>C and 193<sup>0</sup>C (page 2, [0009]).

Art Unit: 1713

Both references are analogous art because they are from the same field of endeavor concerning the obtaining porous membrane for cell. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the non-solvent **octanol**, which has the boiling point **higher** than the solvents **dimethylformamide** or **dimethylacetamide**, as taught by Coowar in Kronfli's process for producing a porous polymeric membrane, because the entire process can be carried out in the absence of water or humidity, reducing the risk of water being present in the final film or membrane, which would be detrimental to the properties of a lithium cell (US'545, page 2, [0009]).

With regard to the limitation of instant claim 2, Kronfli discloses that the polymeric chain may be a homopolymer, i.e. polyvinylidene fluoride (PVdF), or may be a copolymer or terpolymer of vinylidene fluoride (VdF) and other monomers such as hexafluoropropylene (HFP), etc. In these cases the proportion of VdF is preferably no less than 75% by weight (page 2, lines 23-29).

With regard to the limitation of instant claim 3, Kronfli discloses a variety of compatible solvent may be used, including **N-methyl-2-pyrrolidone** (page 5, line 1), **dimethylacetamide (DMA)** (page 6, line 27), etc.

With regard to the limitation of instant claim 5, Kronfli discloses that the prepared solution was poured into a glass Petri dish and left in a dry room **for 5 days** for casting solvent (the DMA) to evaporate, leaving an electrolyte film (page 6, lines 32-34).

Generally, differences in duration, concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence

indicating such duration, concentration or temperature is critical. See *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382: "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."

With regard to the limitation of instant claim 6, Kronfli discloses that the monomers to be grafted must have only one double bond in the carbon chain R-, and one or more **carboxyl groups** –COOH, **sulphonic acid groups** –SO<sub>2</sub>OH, **phosphonic acid groups** –PO(OH)<sub>2</sub>, **ester groups** –COOR', or **amide groups** –CONH<sub>2</sub> (page 2, lines 31-34 and page 3, line 1).

With regard to the limitation of instant claim 8, Kronfli discloses that lithium half cell were constructed by coating the first layer of PVdF-based electrolyte directly onto the composite graphite electrode; coating the second layer of this electrolyte onto release paper, drying it, peeling it from the release paper, and rolling this electrolyte layer onto the first electrolyte layer. A lithium metal electrode was then **laminated** onto the second electrolyte layer at a temperature of 80 C and a pressure of 1 atmosphere (page 11, lines 23-31).

3. Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable as obvious over Coowar et al. (US Patent Application Publication 2003/0170545).

With regard to the limitation of instant claims 1-4 and 6-7, Coowar discloses that a lithium ion cell incorporates a porous polymer membrane, for example a microporous membrane (abstract). The polymeric material in the solution may comprise

Art Unit: 1713

**polyvinylfluoride** (PVdF) homopolymer, or a copolymer or terpolymer consisting primarily of **vinylidene fluoride** (page 1, [0005]). Where a grafted polymer is to be used, the monomer to be grafted onto polymer chain should have only one double bond in the carbon chain R-, and one or more **carboxyl groups**  $-\text{COOH}$ , **sulphonic acid groups**  $-\text{SO}_2\text{OH}$ , **phosphonic acid groups**  $-\text{PO}(\text{OH})_2$ , **ester groups**  $-\text{COOR}'$ , or **amide groups**  $-\text{CONH}_2$  (page 1, [0006]).

The porous membrane is preferably microporous. Such a microporous membrane may be cast from a solvent/non-solvent mixture, or from a latent solvent. The non-solvent should not only dissolve in the solvent, but it should be miscible with the solvent in substantially all proportions. **The boiling point of the non-solvent is preferably higher than that of the solvent**, preferably about  $20^\circ\text{C}$  higher. For example, the solvent might be **dimethylformamide**, or **dimethylacetamide**, in which case a suitable non-solvent is **1-octanol**, which soluble in those solvents and this boiling point is about  $194^\circ\text{C}$ . Alternative non-solvents would be 1-heptanol, 2-octanol, 4-octanol or 3-nonanol, which have the boiling point between  $175^\circ\text{C}$  and  $193^\circ\text{C}$  (page 1-2, [0009]).

Coowar discloses the process comprising the following steps: PVdF is dissolved in dimethylformamide (DMF) and a small amount of 1-octanol is then added dropwise to the polymer solution, and carefully mixed; then the resulting is cast onto an aluminium foil substrate to form a layer, and then passed through a drying tunnel current with two drying zones at temperatures of  $65^\circ\text{C}$  and  $100^\circ\text{C}$  respectively. The dry air is obtained by passing air through a dehumidifier (page 2, [0013]).



The difference between the method of making the porous membrane disclosed by Coowar and that claimed by applicant is that the dispersing the polymer in the non-solvent should be prior to addition of the solvent. However, since applicant does not demonstrate the criticality of adding of non-solvent before adding of solvent, the selection of any order of performing process step is *prima facie* obvious in the absence of unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) and Selection of any order of mixing ingredients is *prima facie* obvious. *In re Gibson* 39 F. 2d 975. 5 USPQ 230 (CCPA). See MPEP § 2144.04

With regard to the limitation of instant claim 8, Coowar discloses that all the layers, the cathode layer, the anode layer, and the porous membrane separator, are bonded together as a result of the gelling of the solution. No separate **lamination** step is required (page 2, [0026]).

### ***Conclusion***

Other references used but not cited in this office action include U.S. Patents 6,013,688, 4,399,035, 4,433,082, 4,267,364, 4,384,047, 4,238,571, 3,620,895, 4,965,291, 4,861,480, 5,158,721, 6,042,958, 6,248,469, 5,296,318, GB 2 309 701 A, EP 0 335 805, US 2003/0170545 and US-2003/0022951 are shown on the Notice of References Cited Form (PTO-892).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Bernshteyn whose telephone number is 571-272-2411. The examiner can normally be reached on M-F 8-5:30.


Art Unit: 1713

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Bernshteyn  
Patent Examiner  
Art Unit 1713

MB  
11/07/2005

  
DAVID W. WU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700